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DEVICE FOR AN INHALER

TECHNICAL FIELD

The present invention relates to a device for an inhaler, which inhaler comprises a container with medicament and means for activating said container for delivery of a dose of medicament.

BACKGROUND OF THE INVENTION

At the present, there is a wide variety of inhalers on the market, where a large quantity of these are so called aerosol-driven inhalers. These comprise a canister comprising the medicament and a gas as propellant. The canister comprises a dispensing device with a spring-loaded stem. When the stem is pressed into the canister, a metered dose of medicament is delivered.

Most aerosol-driven inhalers are provided with some activating means for depressing the canister. These span from simple levers pivotally arranged in the inhaler, which levers press on the side of the canister opposite the dispensing device, usually the bottom of the canister, to sophisticated arrangements comprising spring means acting on the canister, which springs are activated by inhalation. A recent type of inhaler also comprises motor means and control means together with a new type of canister, where the canister delivers medicament as long at it is depressed, and that the control means controls the motor which acts as depressing means for the canister. For example the control means controls the motor to keep the canister depressed for a certain period of time.

Usually, the canisters and the inhalers are manufactured by separate companies, where the canisters have different set dimensions and certain tolerance widths, and the stroke of the dispensing device has a certain stroke. On the market there are a few different canister

sizes depending on the kind of medicament and the number of doses that each canister shall be able to deliver.

The manufacturers of inhalers have these canister measures to cope with when developing an inhaler, developing an inhaler for one specific canister size. Since the general aim for the developer of the inhaler is to keep the overall size as small as possible so that the inhaler is handy and discrete in use, the space inside the inhaler is rather limited. Especially when working with spring activating means it is not possible to use long springs in order to obtain a more or less constant spring characteristics during the depression movement of the canister. Instead transmission means are used to increase the spring force acting on the canister. These transmission means are however affected by differences in tolerances of the canister, of the inhaler, and of canister and inhaler together.

If, as an example, the canister has a tolerance width of a few millimetres over its entire length, which is not unusual, and the inhaler has an overall tolerance width of approximately one millimetre, this could lead to a total tolerance width of the system of several millimetres. With such tolerance widths, either the activating means will have to move quite a distance before coming in contact with a small canister, and thus exposing the canister to sudden impacts from the activating means, or, in the case of a large canister, that the activating means still contains a lot of energy when the canister is depressed. Since the starting point for the activating means varies so much with the tolerance widths built into the system and with the limited space available in the inhaler, it is very difficult to handle such differences and to design an activating means acting with the same predictable characteristics over this span.

BRIEF DESCRIPTION OF THE INVENTION

The aim of the present invention is to allow for an inhaler to accommodate for differences in tolerance widths of containers with medicament and provide a reliable function and predictable dose-to-dose equivalence of the doses delivered. Preferably the inhaler can also accommodate for different container sizes.

This aim is achieved with a device according to the preamble of claim 1 characterised in an adjusting means arranged and designed such as to automatically adjust the contact point between said container and said activating means to accommodate for differences in container size.

With a device according to the invention the function of the inhaler is no longer influenced by the tolerance width variations of container and inhaler, which means that predictable dose-to-dose equivalence is obtained.

Further it increases the robustness and simplifies the design of the inhaler, in particular the activating means for delivering doses, since this no longer has to be over-dimensioned, such as springs, levers, attachments and the like, as the activating means no longer has to deal with the problem of tolerance variations.

These and other aspect of, and advantages with the present invention, will become apparent from the following detailed description of a preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following description of an embodiment of the invention, reference will be made to the accompanying drawings, of which

Fig. 1 is a detailed view of a part of an inhaler comprising the device according to the present invention in a non-active position,

Fig. 2 is the same view as Fig. 1 with the device in an active position, and

Fig. 3 is the same view as Fig. 1 with the device in another active position.

DETAILED DESCRIPTION OF THE INVENTION

The device according to the invention is arranged inside an inhaler. In the drawings parts of an inhaler for aerosol-driven medicament with breath-activated dose-delivering means is shown. The medicament and the aerosol as propellant are stored in a canister 10 where the upper part is shown in the drawings.

In a conventional manner, the canister is arranged with a stem containing a passage at its lower part. The stem protrudes inside the canister, and when the canister is depressed a dose of medicament is delivered through the passage of the stem. Also in a conventional manner, the stem communicates with an inhalation opening, through which the dose is delivered. These parts are not relevant to the invention and are therefor not shown for the sake of clarity.

A depressing means is arranged at the upper part of the canister. In the embodiment shown it comprises a pivotally arranged lever 12 with a portion that is curved downwards somewhat corresponding to the concave shape of the canister end wall. At the opposite end to the pivoting point 14 of the lever, a depression means is arranged, comprising a compression spring (not shown) attached via an arm 16 to the end of the lever.

Above the spring means, an activating means is arranged comprising a flap 26 pivotally arranged in the inhaler in an air passage 28 communicating with the exterior of the inhaler. The shape of the flap and the passage is such that the flap substantially closes the passage when it is in its uppermost position, Fig. 1. The flap is connected to the depression means.

When a patient inhales in order to receive a dose of medicament, the inhalation causes a pressure difference between the interior of the inhaler and the exterior. This pressure difference causes the flap 26 to pivot and the passage 28 to open so that an air flow is created. The pivoting movement of the flap acts on the depression means so that the compression spring pulls the arm 16 downwards whereby the lever 12 is pivoted downwards. The pivoting force depresses the canister 10 so that a dose of medicament is delivered.

An adjustment means 40 according to the invention is also arranged in the inhaler. It comprises a generally L-shaped member 42 arranged in a compartment 44 and movable in a vertical direction. The lower branch of the L-shaped member protrudes somewhat over the end wall of the canister. The lever 12 is pivotally arranged to the lower branch of the L-shaped member adjacent the intersection point with the upper branch. A vertically acting compression spring 46 is arranged between the inhaler housing and the lower branch of the L-shaped member, where the contact point 48 of the spring is somewhat closer to the canister than the pivoting point 14 of the lever. The upper branch of the L-shaped member is provided with a number of teeth 50 arranged on the surface facing inwards. The opposite surface of the compartment is provided with a number of corresponding teeth 52.

When a canister is inserted in the inhaler, the end wall will come in contact with the lower branch of the L-shaped member 42, thereby pushing it upwards somewhat against the force of the compression spring 46. Because the contact point 54 between the L-shaped member and the canister is further out on the lower branch of the L-shaped member than the contact point 48 of the compression spring, the L-shaped member will be tilted somewhat outwards in Fig. 1 when the member is moved upwards by the insertion of the canister. Because of the tilting, the teeth of the upper branch and the compartment are not in contact with each other, Fig. 1.

When the lever is activated upon inhalation, the upwards directed reaction force on the lever at its pivoting point 14 will cause the L-shaped member to pivot around the contact point 48 of the compression spring and the teeth of the upper branch of the L-shaped member and the teeth of the compartment to engage with each other, thereby fixating the vertical position of the member and in turn the position of the pivoting point of the lever, Fig. 2. The adjusting of the pivoting point of the lever by using the end of the canister as a "reference point" ensures a constant and reliable relation between the two with more or less the same angle of the lever in relation to the canister end wall, regardless of differences in tolerances of the different components, i e the canister, the inhaler or both, Fig. 3. With the device according to the invention variations in the order of 10-20% of the length of the lever can readily be handled.

It is to be understood that although the adjusting member is shown with an L-shape where the branch with teeth is facing upwards, this member could be facing downwards with the teeth on the other side of the branch and corresponding teeth on an opposite surface. Further, other configurations of the member are conceivable for

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obtaining the same function of the height adjustment. Also fixating means other than teeth could be used.

In this context it is conceivable to have an adjusting means with the same function, and also using the end wall of the canister as a reference together with the spring means. If the spring means also is adjustable in height, the adjustment span could accommodate for canisters with larger differences in size than tolerance differences.

PATENT CLAIMS

1. Device for an inhaler, which inhaler comprises a container (10) with medicament and means for activating said container (12, 16, 18, 24, 26, 29) for delivery of a dose of medicament, c h a r a c t e r i s e d in an adjusting means (40) arranged and designed such as to automatically adjust the contact point between said container and said activating means to accommodate for differences in container size.

2. Device according to claim 1, c h a r a c t e r i s e d in that the said differences comprise tolerance width variations of the canister and a certain type of canister as well as different canister sizes.

3. Device according to claim 1, c h a r a c t e r i s e d in that said activating means comprises spring means for moving said container upon delivery of dose, and that said adjusting means is able of adjusting said spring means into contact with said container.

4. Device according to claim 1, c h a r a c t e r i s e d in that said activating means comprises lever means.

5. Device according to claim 1, c h a r a c t e r i s e d in that said activating means comprises motor means.

6. Device according to claim 2, c h a r a c t e r i s e d in that said container is an aerosol-driven canister arranged with a dispensing device activated upon depression of said canister, that said activating means comprises pressure means pivotally arranged in said inhaler and acting on said canister, and that said adjustment means is able of moving said pivoting point in correspondence to the size of said canister.

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7. Device according to claim 6, c h a r a c t e r i s e d in that said adjustment means locks said pivoting point upon activation of said pressure means to depress said canister.

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ABSTRACT

The present invention relates to a device for an inhaler, which inhaler comprises a container (10) with medicament and means for activating said container (12, 16, 18, 24, 26, 29) for delivery of a dose of medicament. The invention is characterised in an adjusting means (40) arranged and designed such as to automatically adjust the contact point between said container and said activating means to accommodate for differences in container size.

(Fig. 1)

Fig. 1

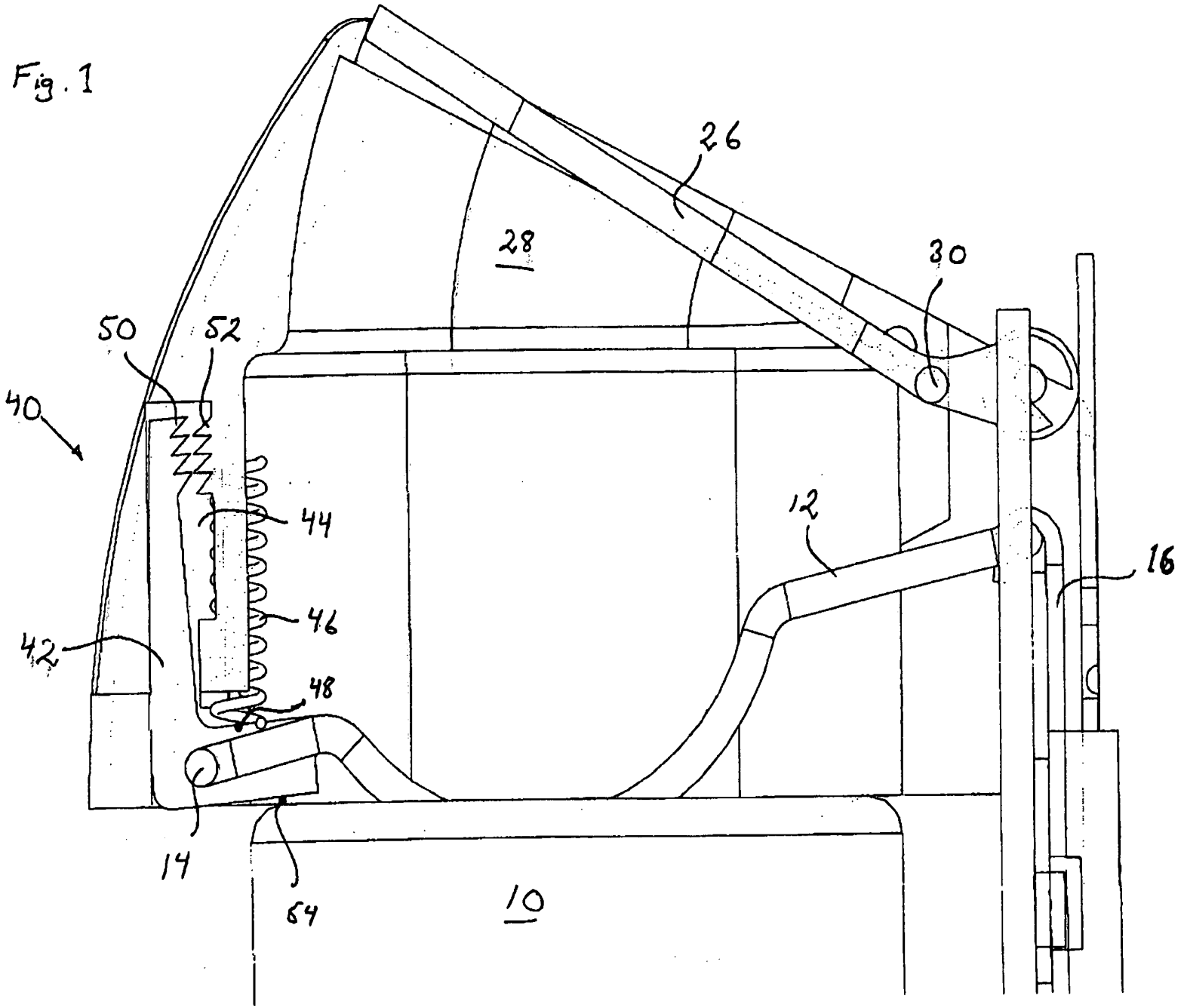

Fig. 2

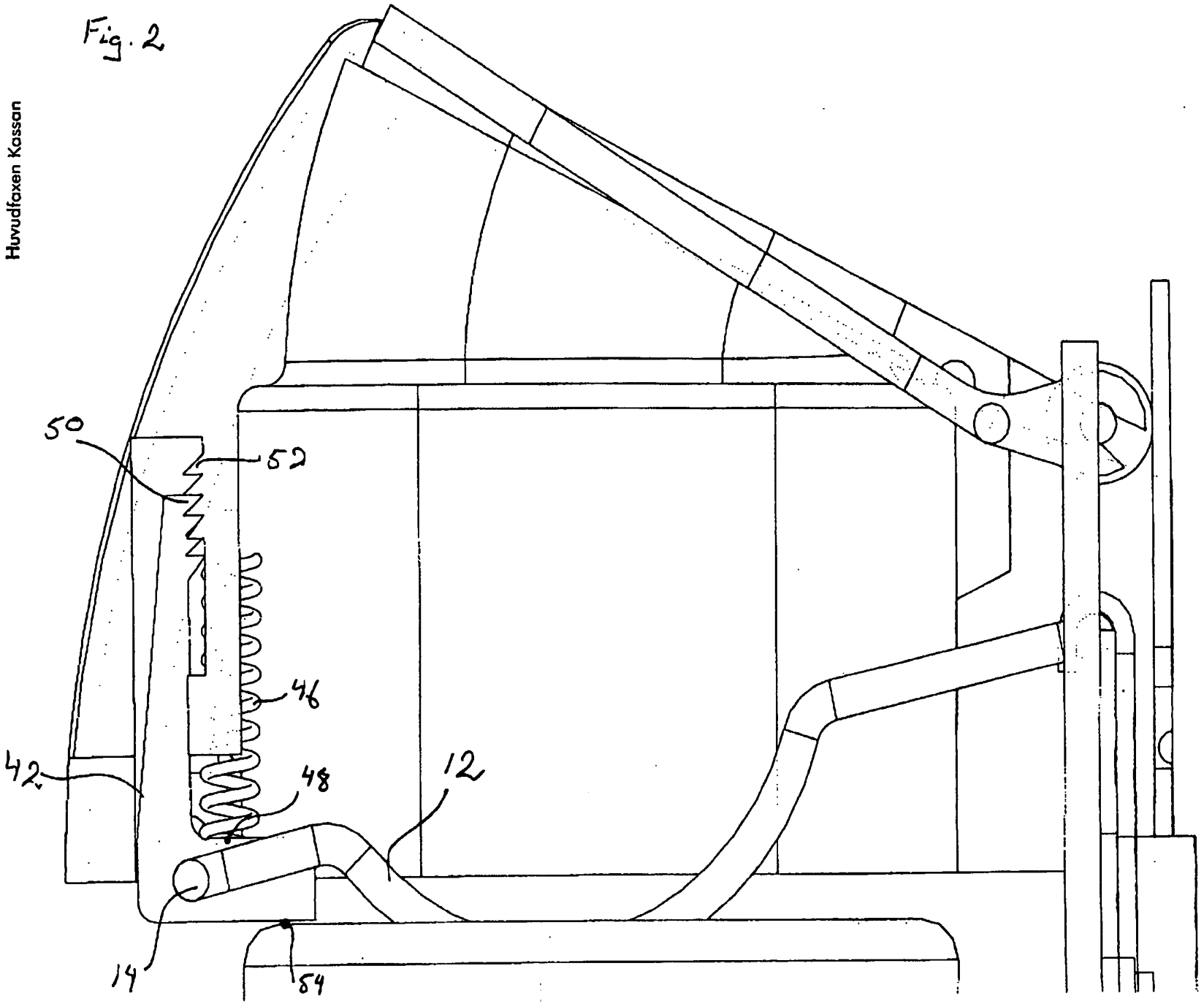

Fig. 3